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Supporting Information for

The role of Ekman currents, geostrophy and Stokes drift in the accumulation of floating microplastic

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Introduction

Within this file we have included supplementary figures S1 to S3, along with the captions for movies S1 and S2.

Figure S1 shows the microplastic distribution in the North Atlantic if we do (S1a) or do not (S1b) include the anti-beaching currents at the coastlines as described in Section 2.4.

Figure S2 shows the global microplastic distribution with the particles being advected by the daily mean Total currents in the 9th, 10th, 11th and 12th year of the Lagrangian simulations. The distribution is shown to be quasi-stationary over this time period.

Figure S3 shows the global microplastic distribution with the particles being advected by the daily mean Total currents in the 9th, 10th, 11th and 12th year of the Lagrangian

simulations. The accumulation in the North Pacific is seen not be a case of large scale accumulation, instead being due to a cluster of particles moving as a whole in the simulation.

Movie S1 shows the North Pacific Geostrophic current Lagrangian simulation. The movie shows that accumulation visible in Figures 2 and S3 is due to a small cluster of particles northeast of Hawaii, and not accumulation with large numbers of particles due to basin-wide circulation as with the Total currents shown in Movie S2.

Movie S2 shows the North Pacific Total current Lagrangian simulation. This movie shows what is seen as large scale accumulation, with the accumulation zone being stable over multiple years with particle concentrations that are much higher than what is seen in Movie S1, and with the accumulation being caused by circulation on a basin-wide scale.

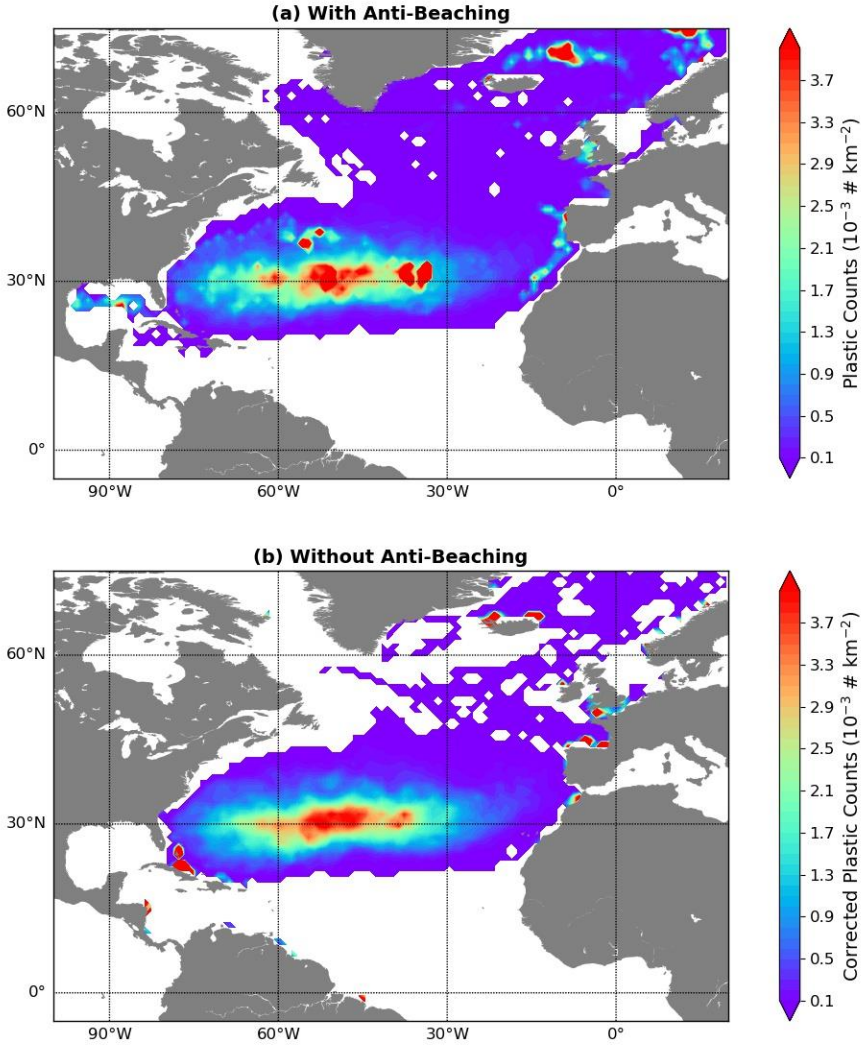

Figure S1. The average particle density of the final year of the North Atlantic Lagrangian runs with the virtual particles advected by the daily mean Total currents, where (a) includes the anti-beaching current at the coastlines and (b) does not. All particles that had beached at the end of the simulation (no change in position over the last 20 days of the simulation) were removed prior to the calculation of the densities to keep only the particles that are floating for the entire simulations (9296 particles without anti-beaching, 18089 particles with anti-beaching). The corrected concentrations in the without anti-beaching simulation are multiplied by 1.95 to correct for the lower particle number in the simulation.

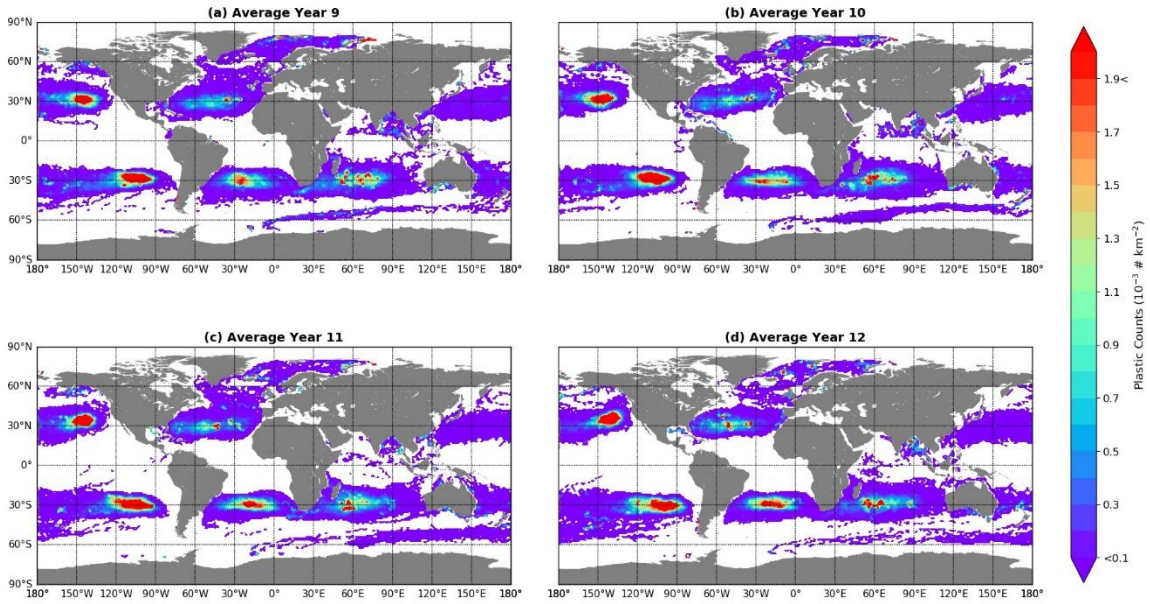

Figure S2. The average particle density of the (a) 9th, (b) 10th, (c) 11th and (d) 12th year of the global Lagrangian runs with the virtual particles advected by the daily mean Total currents.

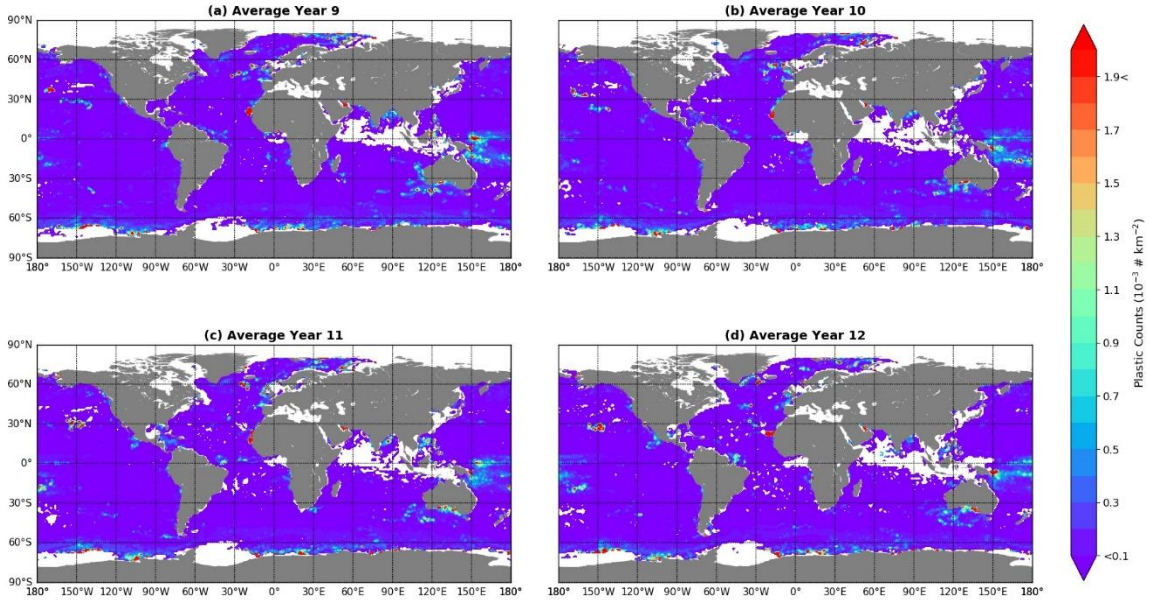

Figure S3. The average particle density of the (a) 9th, (b) 10th, (c) 11th and (d) 12th year of the global Lagrangian runs with the virtual particles advected by the daily mean Geostrophic currents.

Movie S1. Animation showing the North Pacific Geostrophic current Lagrangian simulation. The simulation starts from a uniform distribution and runs from 01-01-2002 to 31-12-2014.

Movie S2. Animation showing the North Pacific Total current Lagrangian simulation. The simulation starts from a uniform distribution and runs from 01-01-2002 to 31-12-2014.